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Polish geological investigations of the Svalbard Archipelago 1934—1979 (an outline)

The Polish geological investigations of the Svalbard archipelago began in 1934 with an expedition sent to Torell Land, Spitsbergen. During that expedition, S. Z. Różycki has prepared a geological map, 1 : 50,000 scale, which covered an area of about 500 square km in the zone of Tertiary folding and its eastern foreland. Różycki's work included a study on stratigraphy of the late Paleozoic, Mesozoic, partly also Tertiary deposits of NW Torell Land, and on Alpine tectonics of that area. His paper published in 1959 contains many data important for modern palinspastic reconstruction of the Alpine fold belt of Spitsbergen.

Geological investigations carried out during scientific expeditions organized in connection with the IIIrd International Geophysical Year and International Geophysical Co-operation (1956—1962), and co-ordinated by K. Birkenmajer, were a direct continuation of Różycki's work from 1934. Along with geological mapping, 1 : 50,000 scale, of southern Torell Land, Wedel Jarlsberg Land and northern Sørkapp Land, altogether about 800 square kilometres (Figs. 1 and 2), K. Birkenmajer elaborated the stratigraphy and tectonics of metamorphic basement complex (Precambrian) and its early Palezoic (Cambrian and Ordovician) superstructure, parts of the Caledonian fold belt of the west coast of Spitsbergen. Birkenmajer has also distinguished a local zone of Variscan folding in inner Hornsund, and extended far to the south a detailed mapping of the Alpine fold belt of Spitsbergen.

The field studies of the Precambrian metamorphic complex carried out by W. Smulikowski (in 1959 and 1960) and by W. Narębski (in 1959), and supplemented by laboratory investigations, allowed to reconstruct the petrologic history of this complex. Stratigraphic and sedimentological studies were carried out in the Devonian, Carboniferous, Permian and Mesozoic (Triassic through Cretaceous) complexes by K. Birkenmajer (in 1958 and 1960), S. Siedlecki (in 1958—62), A. Siedlecka (in 1960) and S. Czarniecki (in 1960). Supported by laboratory data and by palentological determination of fossils, these studies allowed to closer determine the age and conditions of deposition of these sediments. Rich Cambrian, late Palaeozoic and Mesozoic invertebrate faunas collected have been elaborated by specialists in Poland. Ore-mineralization of the Hornsund area has also been studied (by J. Wojciechowski in 1959).

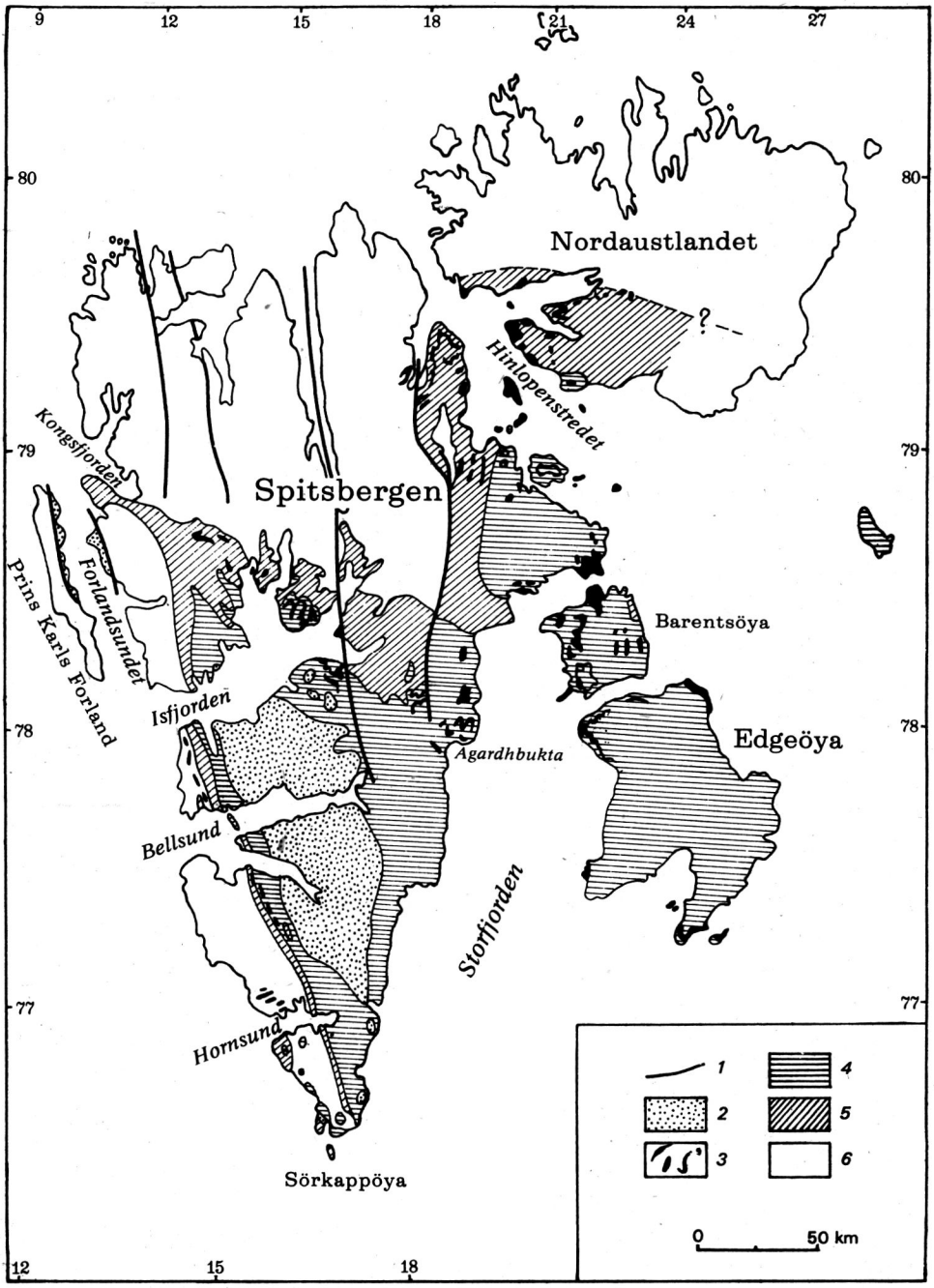

Fig. 1. Geological mapp of Spitsbergen
1 — choosen faults, 2 — tertiary strata, 3 — dolerites, 4 — mesozoic strata, 5 — perm and carbonicerous strata, 6 — precambrian rocks

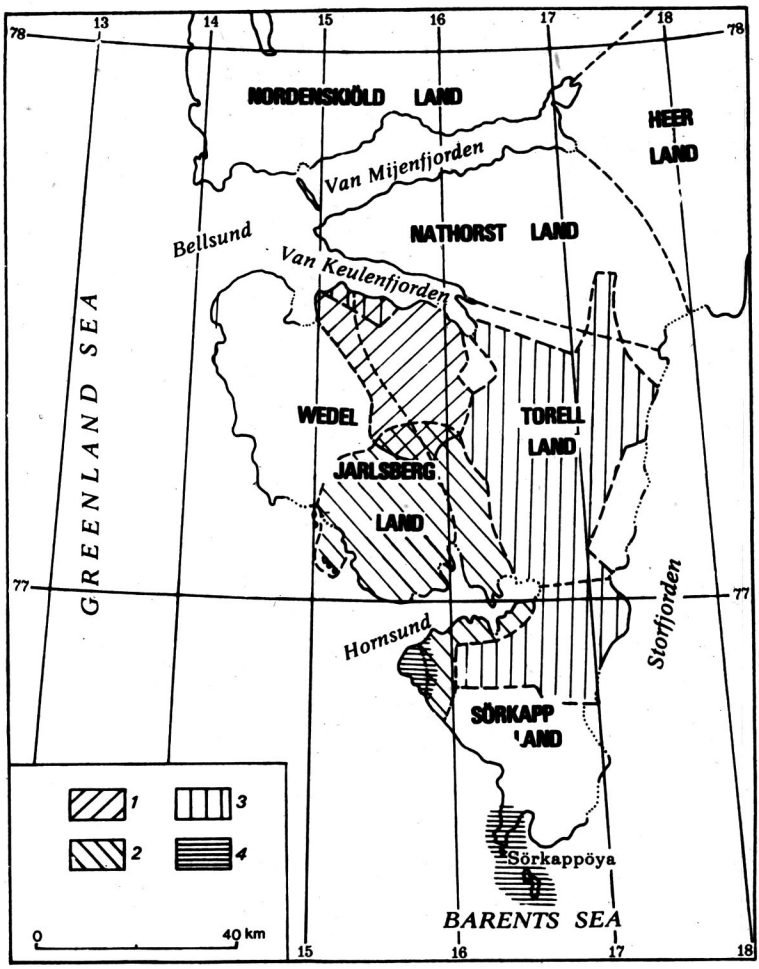

Fig. 2. Area of S-W Spitsbergen investigated during successive Polish geological expeditions 1 — Różycki (1934), 2 — Birkenmajer (1957, 1958, 1960), 3 — Birkenmajer (1962, 1966, 1979), 4 — Siedlecki (1958, 1960, 1962)

From 1962 to 1970 geological investigations in Svalbard were carried out by the Polish geologists as members of the Norwegian expeditions organized by Norsk Polar-institutt (Oslo). K. Birkenmajer (in 1962, 1966 and 1970) investigated stratigraphy and structure of the eastern parts of Torell Land and Sørkapp Land: Mesozoic and early Tertiary deposits, partly also late Palaeozoic through Precambrian strata in the Hornsund area (Figs. 1, 2). S. Siedlecki (in 1964 and 1965) carried out geological research on late Paleozoic deposits of Van Mijenfjorden (Spitsbergen) and Bear Island (Bjørnøya).

Geological investigations have also been carried out parallel with palentological studies during three successive expeditions organized by the Institute of Paleozoology (now: Paleobiology) of the Polish Academy of Sciences, in 1974 (leader K. Birkenmajer), 1975 (leader H. Szaniawski) and

1976 (leader G. Biernat). The main purpose of these expeditions was to study invertebrate faunas and paleoecology of the Permo-Carboniferous, Triassic and Jurassic sedimentary formations. Some early Paleozoic (Cambrian and Ordovician) and late Precambrian algal structures have also been studied. The area investigated included Hornsund (in 1974 and 1975), Bellsund and the mouths of Isfjorden (in 1976).

Oriented samples of Mesozoic dolerites and Paleozoic through Mesozoic sediments for paleomagnetic investigations were taken by a joint Polish--American team (Polish Academy of Sciences — St. Louis University, St. Louis, Mo). under K. Birkenmajer at Hornsund (in 1974) and at Agardhbukta, eastern Spitsbergen (in 1977) and under M. Jeleńska at Hornsund (in 1975) and at Isfjorden and Bellsund (in 1979).

Starting with 1978, the Hornsund area became again a centre for the Polish geological activity in Spitsbergen. Geological studies form a part of the programme of scientific expeditions organized by the Institute of Geophysics of the Polish Academy of Sciences: S. Cieśliński (Quaternary problems, in 1978—79), J. Kopik (Mesozoic faunas and stratigraphy, in 1979), I. Lipiarski (coal-bearing Carboniferous succession, in 1979). The paleontological group of 5 persons under G. Biernat (from the Institute of Paleobiology of the Polish Academy of Sciences) concentrated its work in 1979 in the area of Isfjorden and Bellsund (late Paleozoic and Mesozoic faunas and paleoecology).

The main results of the Polish geological studies of the Svalbard Archipelago have been published in the series Studia Geologica Polonica, an issue of the Institute of Geological Sciences of the Polish Academy of Sciences. The results of the 1934 investigations (by S. Z. Różycki) have been published in 1959; the results of more recent investigations, since the third International Geophysical Year, are being published as "Geological Results of the Polish Spitsbergen Expeditions" (K. Birkenmajer, editor) within the same series of Studia Geologica Polonica. So far, 10 volumes have appeared: Pt. I (1960), II (1960), III (1964), IV (1965), V (1965), VI (1968), VII (1975), VIII (1977), IX (1978) and X (1979). Two more volumes are in press. Moreover, a number of usually shorter papers have been published in other Polish scientific journals, such as Bulletin de l'Académie Polon. Sci., Sér. sci. Terre; Acta Geologica Polonica; Acta Paleontologica Polonica; Przegląd Geofizyczny; Przegląd Geologiczny and others, as well as abroad in the Norsk Polarinstitutt Årbok, Norsk Polarinstitutt Skrifter; Bull. Geol. Soc. Denmark, and others.

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